PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 29 September 1999 (29.09.99)	
International application No. PCT/SE99/00095	**Applicant's or agent's file reference** 2996024/A
International filing date (day/month/year) 25 January 1999 (25.01.99)	**Priority date** (day/month/year) 26 January 1998 (26.01.98)
Applicant HEED, Björn	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

17 August 1999 (17.08.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Borton Claudio

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

FILED IN PATENT OFFICE

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 2996024	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/SE 99/00095	International filing date *(day/month/year)* 25 January 1999	(Earliest) Priority Date *(day/month/year)* 26 January 1998
Applicant Heed Björn		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [ ] **Certain claims were found unsearchable** (See Box I).

2. [ ] **Unity of invention is lacking** (See Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] transcribed by this Authority.

4. With regard to the title,
   - [X] the text is approved as submitted by the applicant.
   - [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   - [X] the text is approved as submitted by the applicant.
   - [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:
   Figure No. 1
   - [ ] as suggested by the applicant.
   - [X] because the applicant failed to suggest a figure.
   - [ ] because this figure better characterizes the invention.
   - [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00095

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F01N 3/28, F23G 7/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: F01N, F23G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9604509 A1 (HEED, BJÖRN), 15 February 1996 (15.02.96) -- --------	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 May 1999	26 -05- 1999
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Bertil Dahl Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

07/04/99

International application No.
PCT/SE 99/00095

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9604509 A1	15/02/96	AU 3088595 A	04/03/96
		CA 2196196 A	15/02/96
		EP 0774099 A	21/05/97
		JP 10504884 T	12/05/98
		SE 503172 C	15/04/96
		SE 9402630 A	05/02/96

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2996024	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE99/00095	International filing date *(day/month/year)* 25.01.1999	Priority date *(day/month/year)* 26.01.1998
International Patent Classification (IPC) or national classification and IPC7 F 01 N 3/28, F 23 G 7/06		
Applicant Heed, Björn		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
17.08.1999	08.05.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88 Telex 17978 PATOREG-S	Authorized officer Marianne Bratsberg/ELY Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE99/00095

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____ , as originally filed,
pages _____ , filed with the demand,
pages _____ , filed with the letter of _____ ,
pages _____ , filed with the letter of _____ .

☐ the claims, Nos. _____ , as originally filed,
Nos. _____ , as amended under Article 19,
Nos. _____ , filed with the demand,
Nos. _____ , filed with the letter of _____ ,
Nos. _____ , filed with the letter of _____ .

☐ the drawings, ~~sheets~~/fig _____ , as originally filed,
~~sheets~~/fig _____ , filed with the demand
~~sheets~~/fig _____ , filed with the letter of _____ ,
~~sheets~~/fig _____ , filed with the letter of _____ .

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, ~~sheets~~/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE99/00095

V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-11	YES
	Claims		NO
Inventive step (IS)	Claims	1-11	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-11	YES
	Claims		NO

2. Citations and explanations

The invention relates to a device for catalytic treatment of gas mixtures. The device consists of a catalyst spread on an accordion-like folded partition wall placed in a casing. The partition wall forms channels with heat exchange through the wall between the incoming and outgoing flows. The inlet and outlet of the catalytic device are located at the sides of the casing and gas reversal chambers are located at both ends of the casing. (See fig. 1)

Most relevant document cited in the International Search Report:

D1: WO 9604509

In D1 a device is described which consists of a catalyst spread on an accordion-like folded partition wall placed in a casing. The partition wall forms channels with heat-exchange through the wall between the incoming and outgoing flows. The inlet and outlet of the catalytic device are located at one end at opposite sides of the casing and a gas reversal chamber is located at the other end of the casing. (See fig. 2 in D1)

The invention according to claim 1 differs from the device described in D1 in that gas reversal chambers are located at both ends of the casing and in that the outlet and the inlet of the device are arranged in between the gas reversal chambers. This technical feature helps to overcome the problem to seal the end of the accordion-like folded package to the casing in order to prevent untreated gas from leaking past the heat exchange-catalyst unit. It is not considered to be obvious for a person skilled in the art to construct the device according to claim 1 with guidance from D1 and background knowledge in the art of construction of catalytic devices.

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Hence, the invention according to the independent claim 1 and the thereupon depending claims 2-11 is novel, is considered to involve an inventive step and to have industrial applicability.

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PATENT COOPERATION TREATY

PCT

REC'D 16 MAY 2000

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2996024	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE99/00095	International filing date *(day/month/year)* 25.01.1999	Priority date *(day/month/year)* 26.01.1998
International Patent Classification (IPC) or national classification and IPC7 F 01 N 3/28, F 23 G 7/06		
Applicant Heed, Björn		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

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3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
17.08.1999	08.05.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88 Telex 17978 PATOREG-S	Authorized officer Marianne Bratsberg/ELY Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

national application No.
PCT/SE99/00095

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____, as originally filed,
pages _____, filed with the demand,
pages _____, filed with the letter of _____,
pages _____, filed with the letter of _____.

☐ the claims, Nos. _____, as originally filed,
Nos. _____, as amended under Article 19,
Nos. _____, filed with the demand,
Nos. _____, filed with the letter of _____,
Nos. _____, filed with the letter of _____.

☐ the drawings, ~~sheets~~/fig _____, as originally filed,
~~sheets~~/fig _____, filed with the demand
~~sheets~~/fig _____, filed with the letter of _____,
~~sheets~~/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, ~~sheets~~/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE99/00095

V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-11	YES
	Claims		NO
Inventive step (IS)	Claims	1-11	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-11	YES
	Claims		NO

2. Citations and explanations

The invention relates to a device for catalytic treatment of gas mixtures. The device consists of a catalyst spread on an accordion-like folded partition wall placed in a casing. The partition wall forms channels with heat exchange through the wall between the incoming and outgoing flows. The inlet and outlet of the catalytic device are located at the sides of the casing and gas reversal chambers are located at both ends of the casing. (See fig. 1)

Most relevant document cited in the International Search Report:

D1: WO 9604509

In D1 a device is described which consists of a catalyst spread on an accordion-like folded partition wall placed in a casing. The partition wall forms channels with heat-exchange through the wall between the incoming and outgoing flows. The inlet and outlet of the catalytic device are located at one end at opposite sides of the casing and a gas reversal chamber is located at the other end of the casing. (See fig. 2 in D1)

The invention according to claim 1 differs from the device described in D1 in that gas reversal chambers are located at both ends of the casing and in that the outlet and the inlet of the device are arranged in between the gas reversal chambers. This technical feature helps to overcome the problem to seal the end of the accordion-like folded package to the casing in order to prevent untreated gas from leaking past the heat exchange-catalyst unit. It is not considered to be obvious for a person skilled in the art to construct the device according to claim 1 with guidance from D1 and background knowledge in the art of construction of catalytic devices.

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Hence, the invention according to the independent claim 1 and the thereupon depending claims 2-11 is novel, is considered to involve an inventive step and to have industrial applicability.

RECORD COPY

PCT
REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

International Application No. PCT/SE99/00095

International Filing Date 25-01-1999

Name of receiving Office and "PCT International Application" The Swedish Patent Office PCT International Application

Applicant's or agent's file reference (if desired)(12 characters maximum) ~~2996011~~ 2996024/K

Box No. I TITLE OF INVENTION

CATALYTIC GAS TREATMENT DEVICE

Box No. II APPLICANT

Name and address: (*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.*)

HEED, Björn
Utlandagatan 19
SE-412 61 GÖTEBORG
Sweden

☒ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (*that is, country*) of nationality: SE

State (*that is, country*) of residence: SE

This person is applicant for the purposes of: ☒ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR /FURTHER INVENTOR(S)

Name and address: (*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.*)

This person is:

☐ applicant only
☐ applicant and inventor
☐ inventor only (*If this check-box is marked, do not fill in below.*)

State (*that is, country*) of nationality:

State (*that is, country*) of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below ~~is hereby~~/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: (*Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.*)

AWAPATENT AB
Box 11394
SE-404 28 GÖTEBORG
SWEDEN

Telephone No. +46 31 150025

Facsimile No. +46 31 150060

Teleprinter No. awapat S

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent

PCT/SE99/00095

25-01-1999

Box No. V DESIGNATION OF [redacted]

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☒ AP **ARIPO Patent**: **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA **Eurasian Patent: AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldovia, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP **European Patent**: **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA **OAPI Patent**: **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)*

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

☒	AL	Albania	☒	LS	Lesotho
☒	AM	Armenia	☒	LT	Lithuania
☒	AT	Austria +Utility Model	☒	LU	Luxembourg
☒	AU	Australia	☒	LV	Latvia
☒	AZ	Azerbaijan	☒	MD	Republic of Moldova
☒	BA	Bosnia and Herzegovina	☒	MG	Madagascar
☒	BB	Barbados	☒	MK	The former Yugoslav Republic of Macedonia
☒	BG	Bulgaria			
☒	BR	Brazil	☒	MN	Mongolia
☒	BY	Belarus	☒	MW	Malawi
☒	CA	Canada	☒	MX	Mexico
☒	CH and LI	Switzerland and Liechtenstein	☒	NO	Norway
☒	CN	China	☒	NZ	New Zealand
☒	CU	Cuba	☒	PL	Poland
☒	CZ	Czech Republic +Utility Model	☒	PT	Portugal
☒	DE	Germany +Utility Model	☒	RO	Romania
☒	DK	Denmark +Utility Model	☒	RU	Russian Federation
☒	EE	Estonia +Utility Model	☒	SD	Sudan
☒	ES	Spain	☒	SE	Sweden
☒	FI	Finland +Utility Model	☒	SG	Singapore
☒	GB	United Kingdom	☒	SI	Slovenia
☒	GD	Grenada	☒	SK	Slovakia +Utility Model
☒	GE	Georgia	☒	SL	Sierra Leone
☒	GH	Ghana	☒	TJ	Tajikistan
☒	GM	Gambia	☒	TM	Turkmenistan
☒	HR	Croatia	☒	TR	Turkey
☒	HU	Hungary	☒	TT	Trinidad and Tobago
☒	ID	Indonesia	☒	UA	Ukraine
☒	IL	Israel	☒	UG	Uganda
☒	IN	India	☒	US	United States of America
☒	IS	Iceland			
☒	JP	Japan	☒	UZ	Uzbekistan
☒	KE	Kenya	☒	VN	Viet Nam
☒	KG	Kyrgyzstan	☒	YU	Yugoslavia
☒	KP	Democratic People's Republic of Korea	☒	ZW	Zimbabve
☒	KR	Republic of Korea			
☒	KZ	Kazakhstan			
☒	LC	Saint Lucia			
☒	LK	Sri Lanka			
☒	LR	Liberia			

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

☐ _____

☐ _____

☐ _____

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

PCT/SE99/00095

25 -01- 1999

Box No. VI PRIORITY C[redacted]I ☐ Further priority claims indicated in the Supplement Box.

Filing date of earlier application (day month year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) 26 January 1998 (26.01.98)	9800197-7	Sweden		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): (1)

** Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(If two or more International Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*

ISA / SE

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*

Date *(day/month/year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets:**

request	: 3
description (excluding sequence listing part)	: 4
claims	: 3
abstract	: 1
drawings	: 1
sequence listing part of description	: –
Total number of sheets	: 12

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☐ copy of general power of attorney; reference No., if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international applications into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listning in computer readable form
9. ☒ other (specify): copy of Official Action

Figure of the drawings which should accompany the abstract:

Language of filing of the international application: Swedish

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Göteborg 22 January 1999

Bo Lindberg

Authorised Representative/AWAPATENT AB

For receiving Office use only

1.	Date of actual receipt of the Purported international application: 25 -01- 1999	2. Drawings: ☒ received ☐ not received
3.	Corrected date of actual receipt due to later but Timely received papers or drawings completing the purported international application:	
4.	Date of timely receipt of the required Corrections under PCT Article 11(2):	
5.	International Searching Authority (if two or more are competent): ISA/SE	6. ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau: 12 MARCH 1999 (12.03.99)

See Notes to the request form

KATALYTISK GASBEHANDLINGSANORDNING

Föreliggande uppfinning avser en anordning för katalytisk behandling av gasblandningar och av det slag som anges i ingressen till efterföljande patentkrav 1.

I svenskt patent nummer 503 172 beskrives en katalysatoranordning som uppvisar ett med katalysator belagt, mönstrat och till bildande av en packe omvikt band för att åstadkomma samtidig värmeväxling och katalytisk behandling av en gasström. Flödet kan därvid delas upp i flera parallella strömmar och samlas ihop igen till ett flöde. Detta sker genom inblåsning och uttag av gasströmmen vid motstående sidor av packen vid dess ena ände. Någon särskild anordning för fördelning av flödet av typ grenrör behövs därvid inte och så länge temperaturen är måttlig innebär det heller inga svårigheter att täta bandpackens ände mot höljets gavel. Det senare är nödvändigt för att förhindra läckage av obehandlad gas förbi värmeväxlar- och katalysatordel.

När ingående gastemperatur är hög så som den t ex är ibland vid behandling av bilavgaser kan det emellertid vara svårt att åstadkomma en bra sådan tätning. Vanliga packningsmaterial eller tätningsmassor av gummi eller plast klarar inte så höga temperaturer. Längs bandpackens sidor går det bra att täta med en matta av keramisk fiberfilt eftersom det där är fråga om stora anliggningsytor. Vid gaveln skall tätning däremot ske mot det tunna bandets kant vilket är mycket svårare.

I enlighet med föreliggande uppfinning kan man komma förbi detta tätningsproblem därigenom att de ömsevisa kanalerna i packen är anslutna till in- respektive vid packens sidor och till vändkamrar vid packens båda ändar, så att gasflöde genom anordningen sker under värmeväxling

mellan in- och utgående flöden vid riktningsväxling av flödet från en inloppsriktning som bildar vinkel mot ifrågavarande bandveck till relativt varandra motsatta riktningar utmed bandets ena sida i packen, därifrån efter vändning utanför packens ändar i respektive vändkammare till bandets andra sida i packen med strömning i omvänd riktning längs bandets veckkanter, och därifrån till en mot sagda kanter vinklad utloppsriktning.

På ritningen beskrives ett utföringsexempel av uppfinningen. För tydlighetens skull visar figuren i uppfinningen i ett isärtaget tillstånd och utan att höljets 2 överdel är med. En mönstrad och omvikt bandpacke 1 är inlagd i ett hölje 2. Inlopp av gas sker genom inloppskanalen 3 som är belägen, vid det visade exemplet, mitt för bandpackens ena sida. Gasflödet fördelar sig på två motsatt varandra riktade strömmar, som går mot packens båda ändar och där belägna vändkamrar 4 och 5. I dessa vändkamrar värms eventuellt gasen av värmarna 7 och 8 eller genom tillförsel av varm gas eller luft till vändkamrarna och vänder sedan tillbaka längs bandets andra sida och går mot bandpackens mitt och ut genom utloppskanalen 6.

Vid gasens passage genom anordningen sker rekuperativ värmeväxling via bandmaterialet mellan gas på väg mot och från vändkamrarna. Det band som bandpacken består av fungerar alltså både som värmeväxlande skiljevägg mellan in- och utgående flöde och som katalysatorbärare. På så vis kan man för den katalytiska behandlingen göra sig oberoende den ingående gasens temperatur och utan stor energitillförsel i vändkamrarna låta den katalytiska behandlingen ske vid en förhöjd temperatur.

Genom uppdelningen av det inkommande flödet i två flöden, ett mot vardera vändkammaren 4 och 5 behövs ingen tätning mot någon gavel. De enda tätningar som behövs är

den som måste vara mellan packens 1 undersida och höljets botten (som inte syns i figuren) och den tätning 7 som måste finnas mellan packens 1 översida och den höljets översida, som inte är med i figuren 1. Bägge dessa kan på grund av den stora anliggningsytan utan problem göras av keramisk fiberfilt. Vid packens bägge ändar och vändkamrarna 4 och 5 behövs ingen tätning. Detta gör anordningen väl ägnad att hantera gas som inkommer till anordningen vid hög temperatur. I vissa lägen, t ex för att inte skada katalysatorbeläggningen, kan man då behöva kyla gasen i vändkamrarna istället för att värma den. Sådan kylning kan med fördel åstadkommas genom tillförsel av kall luft eller gas till vändkamrarna 4 och 5 eller eventuellt med däri anordnade kylslingor eller kylelement. Genom värmeväxlingen mellan den gas som är på väg ut mot vändkamrarna och den gasblandning som är på väg in mot utloppskanalen uppnås därmed att huvuddelen av bandpacken får en lägre temperatur än ingående gas.

En ytterligare fördel med uppfinningen är att vid given bredd och höjd av bandpacken gasens tryckfall vid passage genom anordningen blir lägre än om hela flödet måste gå genom en packe bara åt ena hållet.

På samma sätt som beskrives i svenskt patent nr 503 172 kan man beroende av omständigheterna uppnå fördelar med att belägga båda sidor av bandet med katalysator eller bara ena sidan. Man kan som också beskrives under visa omständigheter uppnå fördelar med att belägga bandets olika sidor med olika katalysatorer. Man kan också som likaledes beskrives ibland med fördel bara belägga de delar av bandet som ligger närmast vändkamrarna med katalysator.

Utförandet av i vändkamrarna anordnade temperings-/temperaturpåverkande anordningar, såsom uppvärmningsanordningar och/eller kylanordningar kan förändras

på många sätt utan att uppfinningens grundtanke frångås. Likaledes kan dessa anordningar i de båda kamrarna vara av inbördes olika slag.

PATENTKRAV

1. Anordning för katalytisk behandling av gasblandningar, varvid:

a) katalysatorn är utbredd på en bärare som samtidigt utgör skiljande vägg i en rekuperativ värmeväxlare,

b) den skiljande väggen består av ett formmönstrat band av metall eller keramik, som dragspelsbälgartat är omvikt till en packe 1, och

c) packen formar ömsevist liggande kanaler med värmeväxling genom bandmaterialet mellan kanalerna där kanalernas geometri bestäms av bandets omvikning och formmönstring, k ä n n e t e c k n a d av, att de ömsevisa kanalerna i packen 1 är anslutna till inrespektive utlopp (3, 6) vid packens (1) sidor och till vändkamrar (4,5) vid packens båda ändar, så att gasflöde genom anordningen sker under värmeväxling mellan in- och utgående flöden vid riktningsväxling av flödet från en inloppsriktning som bildar vinkel mot ifrågavarande bandveck till relativt varandra motsatta riktningar utmed bandets ena sida i packen, därifrån efter vändning utanför packens ändar i respektive vändkammare till bandets andra sida i packen med strömning i omvänd riktning längs bandets veckkanter, och därifrån till en mot sagda kanter vinklad utloppsriktning.

2. Anordning för katalytisk behandling av gaser enligt krav 1, k ä n n e t e c k n a d av, att åtminstone en av vändkamrarna (4, 5) innehåller den förbiströmmande gasens temperaturpåverkande tempereringsanordningar, företrädesvis uppvärmningsanordningar (7, 8).

3. Anordning för katalytisk behandling av gaser enligt krav 2, k ä n n e t e c k n a d av, att uppvärmnings-

anordningen i åtminstone ena vändkammaren består av elvärmare.

4. Anordning för katalytisk behandling av gaser enligt krav 2, k ä n n e t e c k n a d av, att den uppvisar uppvärmningsanordningar med brännare för gas eller flytande bränsle.

5. Anordning för katalytisk behandling av gaser enligt krav 1, k ä n n e t e c k n a d av, att den är avpassad för uppvärmning av åtminstone endera av vändkamrarna (4, 5) genom tillförsel av varm gas.

6. Anordning för katalytisk behandling av gaser enligt krav 1, k ä n n e t e c k n a d av, att den är avpassad för kylning av åtminstone den ena av vändkamrarna (4, 5) genom tillförsel av kall gas.

7. Anordning för katalytisk behandling av gaser enligt krav 1, k ä n n e t e c k n a d av, att den uppvisar kylelement i ifrågavarande vändkammare.

8. Anordning för katalytisk behandling av gaser enligt krav 1-6, k ä n n e t e c k n a d av, att bandet är belagt med katalysator på bandets inloppssida och eventuellt dess utloppssida.

9. Anordning för katalytisk behandling av gaser enligt krav 1-6, k ä n n e t e c k n a d av, att bandet är belagt med katalysator bara på bandets utloppssida.

10. Anordning för katalytisk behandling av gaser enligt krav 1-6, k ä n n e t e c k n a d av, att bandets båda sidor är belagda med olika slags katalysatorer.

11. Anordning för katalytisk behandling av gaser enligt krav 1-9, k ä n n e t e c k n a d av, att bandet är belagt med katalysator bara på de delar som ligger närmast vändkamrarna (4, 5).

PCT/SE99/00095

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SAMMANFATTNING

Anordning för katalytisk behandling av luft eller gaser. Katalysatorn bärs av ett formmönstrat band som är omvikt till en packe (1) som inlagt i ett hölje (2) bildar två grupper av parallella strömningskanaler med enkel anslutning (9, 10) för in- och utgående flöden vid packens (1) sidor och vändkamrar (4, 5) vid packens ändar. Vändkamrarna kan innehålla anordningar för värmning eller kylning. Genom värmeväxling mellan in- och utgående flöden erhålles god värmeekonomi.

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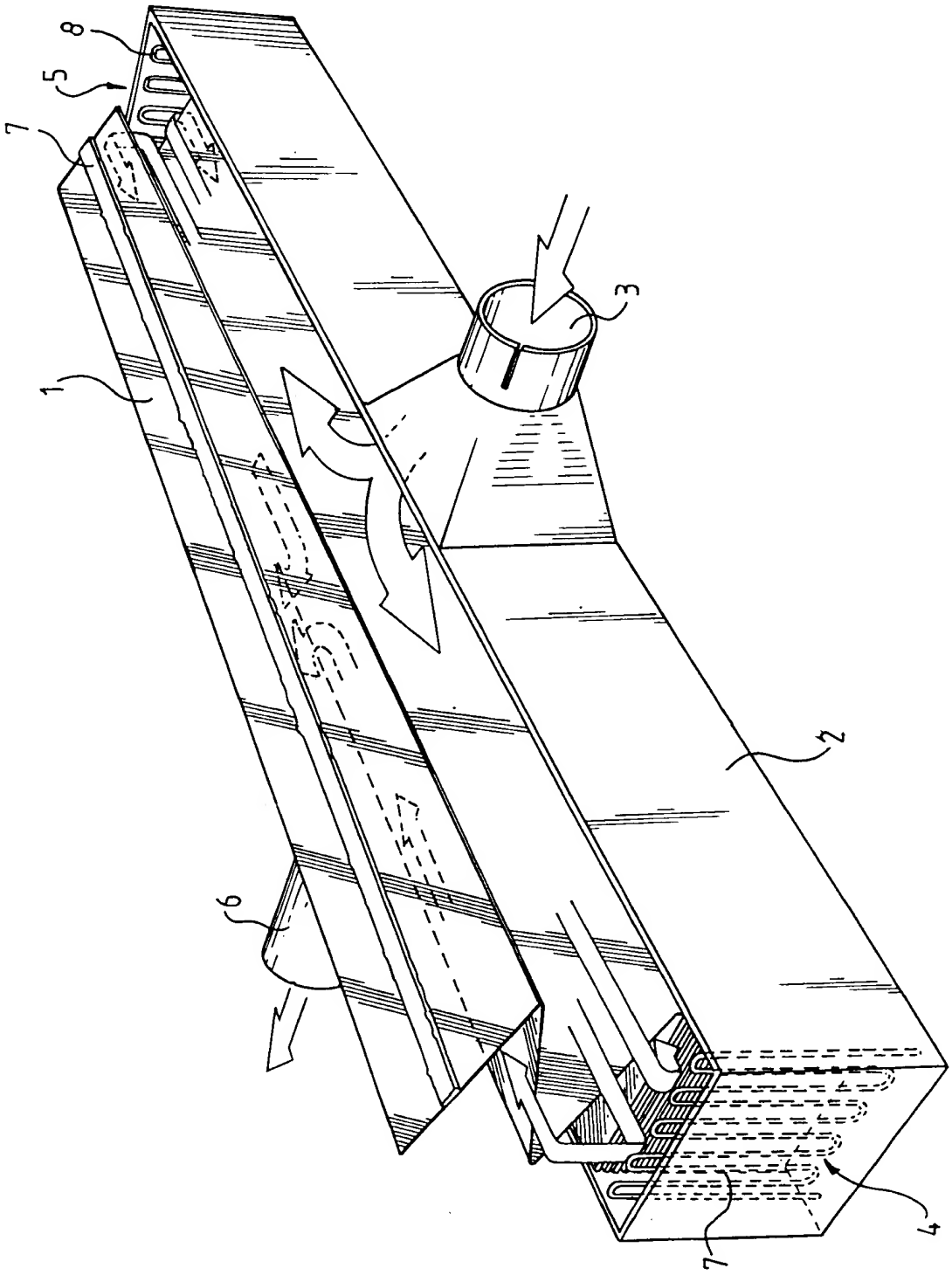

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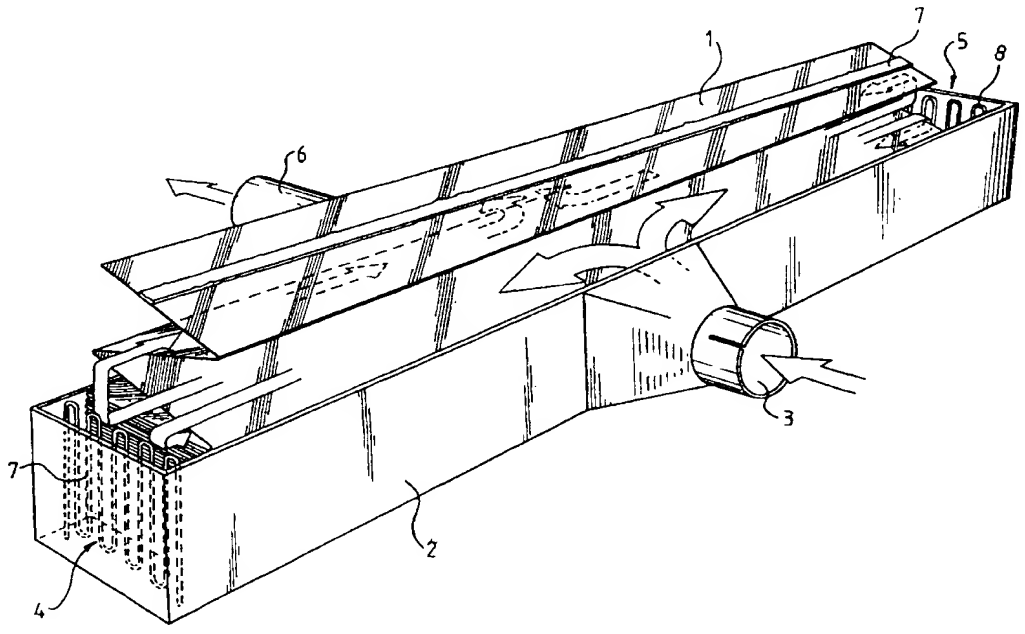

(57) Abstract

A device for catalytic treatment of air or gases. The catalyst is carried on a shaped patterned band. The band is folded into a package (1), which, when received in a casing (2), forms two groups of parallel flow channels having a single connection (9, 10) for incoming and exiting flows at the sides of the package (1), and gas reversal chambers (4, 5) at the package ends. The gas reversal chambers may enclose heating or cooling devices. The exchange of heat between the incoming flow and the exiting flow provides excellent heat economy.

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CATALYTIC GAS TREATMENT DEVICE

The present invention relates to a catalytic gas-mixture treatment device of the kind defined in the preamble of the appended claim 1.

The Swedish Patent No. 503 172 describes a catalytic device comprising a catalyst-coated, patterned band, which is folded into a package for the purpose of simultaneously achieving heat exchange and catalytic treatment of a flow of gas. In the process, the flow may be divided into several parallel part flows, which are again united into one single flow. This is effected by blowing the gas flow into and withdrawing it from the package at opposite package sides at one of the package ends. There is no need for a separate gas-distributing device of manifold type and as long as the temperature is moderate, there is no difficulty in sealing the band-package end against the end wall of the enclosure or casing. Such sealing is necessary to prevent untreated gas from leaking past the heat exchange-catalyst unit.

When the temperature of the entering gas is high, which sometimes is the case in the treatment of motor vehicle exhaust gases, it may be difficult to achieve efficient sealing of this kind. Conventional sealing materials or sealing compounds of rubber or plastics cannot withstand the high temperatures involved. A sheet of ceramic fibrous felt may be used as the seal along the sides of the band package, where considerable surfaces of contact exist. On the other hand, at the end walls, the seal is to be applied against the thin edges of the band, which makes efficient sealing much more difficult to achieve.

In accordance with the present invention a solution to this sealing problem has been found in that the channels in the package alternately are connected to inlets or outlets located at the sides of the package and to gas

reversal chambers located one at both ends of the package, whereby as the gas flows through the device, heat will be exchanged between the incoming and exiting flows as the flow direction changes from a direction of entry at an angle to the band folds to mutually opposite directions along one side of the band in the package, and from there, following reversal externally of the package ends in the respective gas reversal chamber, to the opposite side of the band in the pack while flowing in the opposite direction along the edges of the band folds, and from there towards a direction of exit at an angle to said edges.

One embodiment of the invention is illustrated in the accompanying drawing figure. For the sake of clarity, the drawing figure illustrates the inventive object in an unassembled condition and without the top of the casing 2. A package 1 of a patterned and folded band is received inside a casing 2. Gas enters through an inlet port 3, in the example shown centrally on one side of the band package. The gas flow divides into two oppositely directed part flows, each flowing towards its respective package end and the gas reversal chambers 4 and 5 located there. In the gas reversal chambers the gas may be heated by the heating elements 7 and 8, respectively, alternatively by hot gas or hot air supplied to the gas reversal chambers, and from these chambers the gas reverses, flowing along the opposite side of the band, towards the centre of the band package and exits through the outlet port 6.

As the gas passes through the device, recuperative exchange of heat takes place via the band material between gas on its way to and gas on its way from, respectively, the gas reversal chambers. The band constituting the band package consequently serves both as a heat-exchange partition wall between the incoming and exiting flows and as a catalyst carrier. In this manner, the heat-exchange process is made independent of the temperature of the incoming gas and the catalytic

treatment may be carried out at an high temperature without considerable amounts of energy having to be supplied in the gas reversal chambers.

Owing to the division of the incoming flow into two part flows, one to each gas reversal chamber 4, 5, sealing against the end walls is not necessary. The only seals needed are the seal positioned between the bottom face of the package 1 and the casing bottom (not shown in the drawing figure) and the seal 7 required between the upper face of the package 1 and the casing top, not included in the drawing figure. Owing to the considerable surface of contact, these seals may both consist of ceramic fibrous felt. No sealing is required at the two package ends and the gas reversal chambers 4, 5. This feature makes the inventive device highly suitable for treatment of gas entering the device at a high temperature. In some cases, for example to prevent damage to the catalyst coating, it may be necessary to cool the gas in the gas reversal chambers rather than heating it. Advantageously, cooling is effected by supply of cool air or gas to the gas reversal chambers 4, 5 or, alternatively, by means of refrigerating coils or refrigerating elements located therein. As a result of the heat exchange taking place between the gas flowing towards the gas reversal chambers and the gas mixture flowing towards the outlet port, the major part of the band package will have a lower temperature than the incoming gas.

A further advantage of the invention is that for a given width and height of the band package the pressure drop of the gas passing through the device is smaller than it would have been, had the entire gas flow been forced to pass through a package in one direction only.

In the manner described in the Swedish Patent No 503 172 it may be advantageous, depending on the prevailing circumstances, to coat both band sides or only one side thereof with a catalyst. As described in that publication, it may also in some instances be advan-

tageous to coat the two band sides with a different catalyst. Furthermore, as also described therein, it may sometimes be advantagecus to coat only the parts of the band closest to the gas reversal chambers with a catalyst.

The design and arrangement of the temperature-modifying and temperature-controlling devices, such as heating and/or refrigerating devices, that are located in the gas reversal chambers, may be altered in many different ways without departure from the inventive idea. Also, the devices in the two chambers may be of a mutually different nature.

CLAIMS

1. A device for catalytic treatment of gas mixtures, wherein:

a) the catalyst is spread on a carrier, which also forms a partition wall in a recuperative heat exchanger,

b) the partition wall consists of a shaped patterned band of metal or ceramic, which is folded in an accordion-like manner into a package (1), and

c) the package forms alternately disposed channels with exchange of heat taking place between the channels through the band material, the geometry of the channels being determined by the folding and the shaped pattern of the band, c h a r a c t e r i s e d in that the alternately disposed channels in the package (1) are connected to inlets or outlets (3, 6) located at the sides of the package (1) and to gas reversal chambers (4, 5) located one at both ends of the package, whereby as the gas flows through the device, heat will be exchanged between the incoming and exiting flows as the flow direction changes from a direction of entry at an angle to the band folds to mutually opposite directions along one side of the band in the package, and from there, following reversal externally of the package ends in the respective gas reversal chamber, to the opposite side of the band in the pack while flowing in the opposite direction along the edges of the band folds, and from there towards a direction of exit at an angle to said edges.

2. A device for catalytic treatment of gas as claimed in claim 1, c h a r a c t e r i s e d in that at least one of the gas reversal chambers (4, 5) houses devices controlling and affecting the temperature of the gas flowing past said chambers, said devices preferably being heating devices (7, 8).

3. A device for catalytic treatment of gas as claimed in claim 2, c h a r a c t e r i s e d in that at

least in one of the gas reversal chambers said heating device is an electric heater.

4. A device for catalytic treatment of gas as claimed in claim 2, c h a r a c t e r i s e d in that it comprises heating devices including burners using gas or liquid fuel.

5. A device for catalytic treatment of gas as claimed in claim 1, c h a r a c t e r i s e d in that it is adapted for heating at least one of the gas reversal chambers (4, 5) by means of supply of hot gas.

6. A device for catalytic treatment of gas as claimed in claim 1, c h a r a c t e r i s e d in that it is adapted for cooling at least one of the gas reversal chambers (4, 5) by means of supply of cool gas.

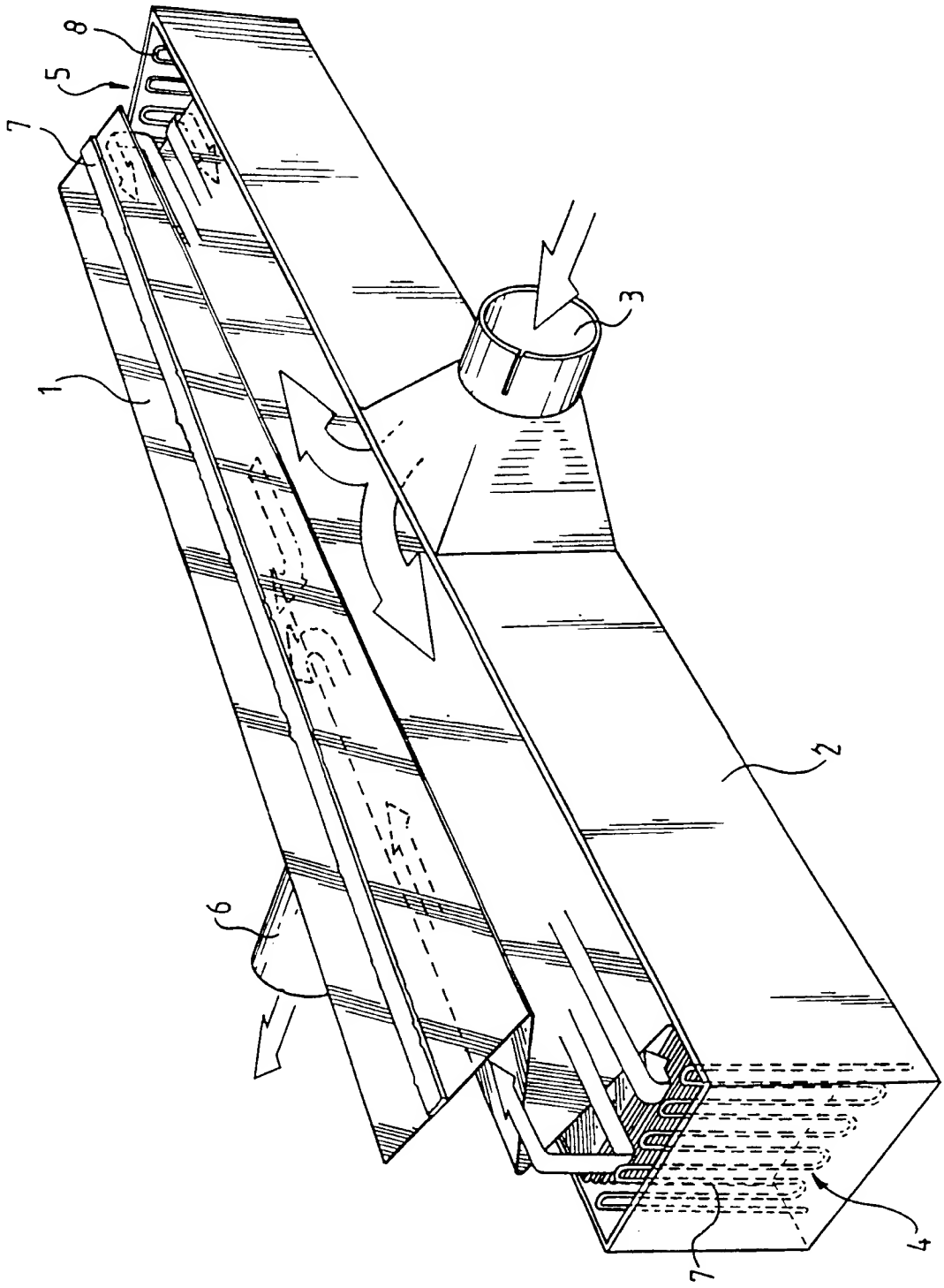
7. A device for catalytic treatment of gas as claimed in claim 1, c h a r a c t e r i s e d in that it comprises refrigerating elements disposed in the gas reversal chamber in question.

8. A device for catalytic treatment of gas as claimed in claims 1 - 6, c h a r a c t e r i s e d in that the band is coated with a catalyst on the inlet side of the band and possibly also on the outlet side of the band.

9. A device for catalytic treatment of gas as claimed in claim 1 - 6, c h a r a c t e r i s e d in that the band is coated with a catalyst only on the outlet side of the band.

10. A device for catalytic treatment of gas as claimed in claims 1 - 6, c h a r a c t e r i s e d in that the two sides of the band are coated with a different kind of catalyst.

11. A device for catalytic treatment of gas as claimed in claim 1 - 9, c h a r a c t e r i s e d in that the band is coated with a catalyst only on the band parts closest to the gas reversal chambers (4, 5).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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00095

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F01N 3/28, F23G 7/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9604509 A1 (HEED, BJÖRN), 15 February 1996 (15.02.96) -- --------	1-11

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9604509 A1	15/02/96	AU 3088595 A	04/03/96
		CA 2196196 A	15/02/96
		EP 0774099 A	21/05/97
		JP 10504884 T	12/05/98
		SE 503172 C	15/04/96
		SE 9402630 A	05/02/96